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SEP 1915

Concrete Reinforcing and Furring Plates

Reinforced Concrete

THE BERGER MFG. CO.
CANTON, OHIO

GENERAL INDEX

BERGER'S

Patented

Improved RIB-TRUS

Plates

for

Reinforced Concrete Construction

of

Roofs, Floors
Sidings

Etc., Etc.

INDEX TO IMPROVED RIB-TRUS SECTION

A FEW INTRODUCTORY WORDS ON IMPROVED

RIB-TRUS

In producing Improved RIB-TRUS our aim has been to design a reinforcing plate eliminating as far as possible all objectionable features previously existing in expanded metal plates, and judging from the great favor with which our RIB-TRUS reinforcing and furring plate has been received, we feel that we have succeeded in giving to the Engineer, Architect and Owner a superior structural medium—a plate which saves labor, material and money.

Improved RIB-TRUS is not expanded laterally but vertically. The soft concrete is therefore prevented from dripping or running through the plate and wasting. This has been the great trouble with expanded metal reinforcing plates, and one of the principal faults which we have overcome. This feature not only saves material and labor, but prevents the soft concrete from dripping on the men, as well as on the materials, machinery, etc., on lower floors.

Improved RIB-TRUS loses none of its tensile strength in manufacture, owing to the fact that the plates are slitted only parallel with the strain or ribs, and not cut or slitted at right angles to the length of plate, which would materially weaken its strength. Every ounce of metal in a RIB-TRUS Plate goes into tension and adds strength to the construction.

Improved RIB-TRUS Plates are heavier per square foot, gauge for gauge, than any other plate on the market. We give the gauges and corresponding weights of our plates, hence the purchaser can check the weight and know that he is not being deceived by light gauges. This is an important factor.

Improved RIB-TRUS Plates are made 24 inches wide and any length desired up to 12 feet. Having our own Rolling Mills we can roll plates to any exact length without extra cost if given three weeks' time for executing the order.

Through a new manufacturing method all RIB-TRUS Plates are made absolutely the same in size—one plate being a fac-simile of another. This uniformity enables the plates to be put in place much quicker and truer than any other plate made by drawing or rolling.

Improved RIB-TRUS eliminates all false work or centering as the plates are self-centering, which is a great saving factor—no waiting till cement gets hard enough before drawing or striking of centering. There is no risk incurred on pulling the centering too soon. With RIB-TRUS you work ahead as fast as you desire and finish out. No false work to bother with—no depreciation—no loss—no waste.

Improved RIB-TRUS is the stiffest, strongest, and most efficient plate that has ever been offered for reinforcing purposes.

BERGER'S IMPROVED RIB-TRUS PLATES

GENERAL DESCRIPTION

APPLICATION.—Improved RIB-TRUS is a sheet metal plate designed to meet the demand for a permanent, fireproof, self-centering, reinforcing and furring plate for roofs, side walls, floors, flat and curved arch ceilings, etc., and in fact, for every purpose for which concrete or plaster may be used. It is also recommended for stucco and plaster work.

Fig. 1. Improved RIB-TRUS Plates Ready to Lay

MATERIALS.—To meet the demand of up-to-date methods and permanent construction RIB-TRUS is made of either Open Hearth Sheet Steel or Rust-Resisting Toncan Metal.

DESIGN.—The plates are designed each with five longitudinal ribs, six inches on centers, varying in height as follows: ½ inch, ¾ inch, 1 inch, and 1¼ inch, ¾ inch being standard. A series of cross bonds, 2 inches on centers, run across the plate between and at *right angles* to the ribs. The metal between the ribs is slit into truss loops that are staggered vertically and span between these bonds parallel to the ribs. The design of the loops produces a dove-tail clinch on the under side, thereby locking the plaster on below with the concrete

GENERAL DESCRIPTION OF IMPROVED RIB-TRUS

Continued

above, resulting in a homogeneous mass thoroughly reinforced by the strength of the plate. The plate not being expanded laterally prevents the concrete from dripping to any extent; which, if not prevented, would be a very objectionable feature, interfering with the workmen below to such a degree that work must be suspended until the concreting is completed.

CONSTRUCTION.—Improved RIB-TRUS plates are constructed under a new process which does not permit of any variation in the different plates. A plate made to-day is an exact fac-simile of one made a year ago and will be the same as one made one year hence.

This exact method of production prevents any trouble in laying the plates.

Fig. 2. Improved RIB-TRUS Plates Concreted

STRENGTH.—The rigidity imparted to the plate by the ribs (which act as beams) is so great that no support or bracing is needed on short spans. By slitting the metal *only* parallel to the strain (also parallel to the ribs) no tensile strength of the metal is lost, all of the metal going into tension.

CONVENIENCE.—The method of applying RIB-TRUS is as simple as the plate itself. The greater width and more perfect manufacture enable the plates to be more quickly and easily applied. The ribs in many instances do away with the need of special furring strips—especially for ceilings, stucco work and similar uses.

BONDING QUALITIES.—When the concrete is applied to the plate it passes through between the loops, forming a perfect bond around them, and when thoroughly set is permanently and securely locked.

GENERAL DESCRIPTION OF IMPROVED RIB-TRUS

Continued

Elongation of the plate can take place only after the concrete has been crushed—a practical impossibility. (See Figure 2.)

ECONOMICAL.—The effective design of the interlocking loops retains practically all the cement, and the amount of drip is so extremely small that an enormous saving in material is effected.

The RIB-TRUS Plate acts as a safeguard against faulty work, yet with its use much less time is required for the completion of a contract than is required for other reinforcing materials.

Low cost, saving in material and labor, and better work are strong features that combine to popularize RIB-TRUS.

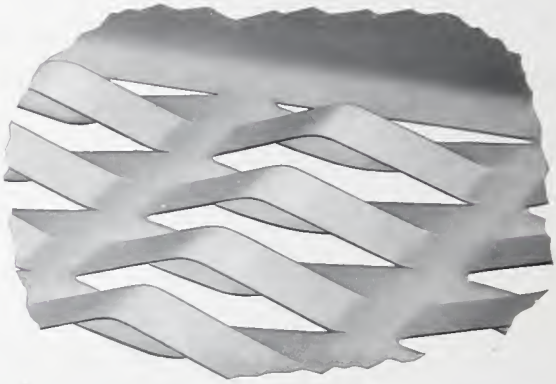


Fig. 3. Showing the Trusses or Mesh Three-fourths Full Size

PLATE STANDARD.—Standard sheets are 18 and 24 inches wide and are carried in stock in 4, 5, 6, 8, 10 and 12-feet lengths with rib heights varying as follows: ½, ¾, 1 and 1¼ inch, the standard being ¾ inch.

RIB-TRUS Plates are made from sheets of full gauges and weights, and you will note that the gauges with corresponding weights are opposite page so that you may always know that you have received the gauge ordered. This is a very important factor with the engineer, architect, and owner.

Sheets are made in either 28, 27, 26 and 24 gauges—either plain or painted.

GENERAL DESCRIPTION OF IMPROVED RIB-TRUS

Continued

WEIGHTS, SIZES AND LENGTHS

Gauge.	Covering, Width, Inches.	Stock Lengths, Feet.	Weight Per Square, Pounds ½" Rib.	¾" Rib.	1" Rib.	1¼" Rib.
28	24	4, 5, 6, 8, 10 and 12	73	78	83	88
27	24	4, 5, 6, 8, 10 and 12	81	86	92	98
26	24	4, 5, 6, 8, 10 and 12	88	94	100	106
24	24	4, 5, 6, 8, 10 and 12	117	125	133	141
	Also 18	4, 5, 6, 8, 10 and 12				

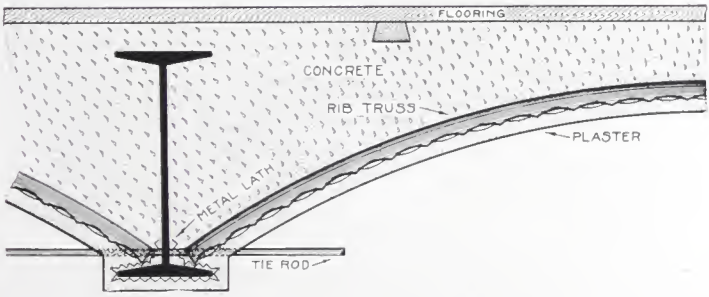


Fig. 4. Segmental Arch Floor Construction

All depths and gauges can be furnished in any length up to and including 12 feet, and can be furnished cut to size, bent to any curvature or radius over 12 inches, or formed into special shape such as may be required for cornice work, saw tooth roofs, ridges, valleys, etc. Complete circles can be made for culverts, sewers, conduits, etc. They can be curved for segmental arch construction in Nos. 26 and 24 gauges and depths of ½ and ¾ inch. No higher rib or lighter gauge can be curved excepting for large segments.

Three-fourth inch ribs are the highest that can be sprung to place between beams for arch work.

IMPROVED RIB-TRUS AS CENTERING

Improved RIB-TRUS, when used as reinforcement for floors and roofs, results in saving of time, material and labor.

On short spans (see table page 31), no false work or centering is required—no delays—no lumber necessary. These points are of vital importance when figuring comparative costs of RIB-TRUS and other systems of construction that do not require centering.

Another important factor is the risk of collapse from pulling or removing centering too soon. With Improved RIB-TRUS there is no centering to be removed and the work may be rushed at any speed desired without the slightest danger, delay, inconvenience, expense or risk.

The Taylor-Boggis Foundry Co., Cleveland, O.
107,000 Feet Toncan Metal RIB-TRUS Used
Contractor, John Gill & Sons; Architect, Cleveland Engineering Co.

IMPROVED RIB-TRUS FOR ROOFING CONSTRUCTION

FIRE PROOF—ACID PROOF—TIME PROOF

The Taylor-Boggis Foundry Co., Cleveland, O.

Although corrugated iron roofs may be somewhat cheaper than the concrete roof, the additional length of life of the latter far more than offsets the slight difference in first cost, yet some forms of concrete roofing construction are not altogether desirable. Roof Trusses are usually located high above the ground. Because of this fact it is a very difficult matter and exceedingly inconvenient and expensive to erect centering for a concrete slab to be reinforced with rods, expanded metal, etc.

RIB-TRUS plates are self-centering, requiring no false work on short spans and the application is made directly upon the roof framing with purlins spaced at proper intervals, usually about four feet apart.

IMPROVED RIB-TRUS FOR ROOFING CONSTRUCTION

Continued

RIB-TRUS Used on Roof and Sides at Union Metal Manufacturing Co. Building, Canton, O.

The dead load is also materially reduced and this reduction naturally decreases the amount of structural steel required to carry the roof.

With Improved RIB-TRUS very thin slabs are made, reducing the material to be handled to a minimum yet giving the desired strength.

Using ½-inch RIB-TRUS a slab 1 inch thick can be made, but we recommend a deeper rib with greater rigidity on account of the additional strain while filling in the concrete.

The most desirable spacing of purlins is at centers of 3 feet 10½ inches, 4 feet 4½ inches and 4 feet 10½ inches, providing for the use of 8, 9, and 10-foot sheets covering two spans and allowing a 3-inch lap at the end of the plate. The plates are placed in position and securely anchored to the framing by special clips.

The Standard Improved RIB-TRUS Roof Slab with 1½-inch concrete over the plate weighs approximately 18 pounds per square foot, concreted, plastered, and waterproofed.

The application of these plates for concrete roof construction is explained in detail, beginning with page 8.

THE LAYING OF AN IMPROVED RIB-TRUS ROOF

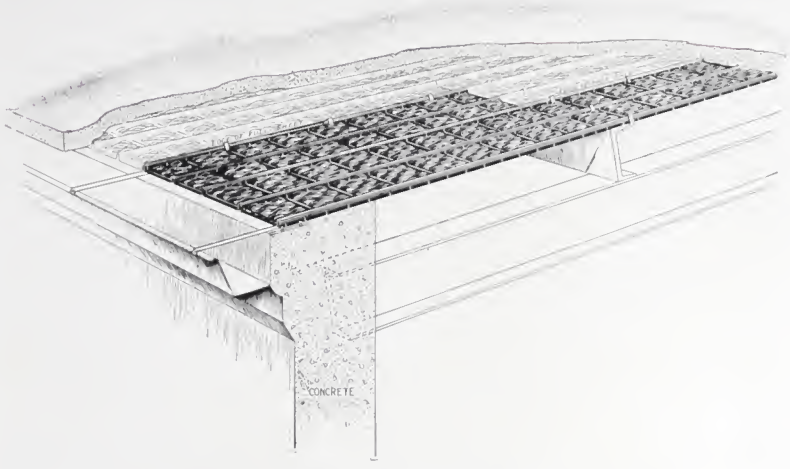


Fig. 5. RIB-TRUS Plates Showing Proper Method of Application

The first course of plates should be laid at the eaves or lower edge of the roof. The lower ends of these plates should be clipped or fastened to purlin or bearing. The upper end of the first course is overlapped and held securely by the lower end of the second course. Continue in this manner until the cone of roof is reached when both ends should be fastened. The sheets of every other course should be staggered. In other words, the starter of the second course should be a half sheet, thereby preventing all laps coming together, which would result in four thicknesses of metal

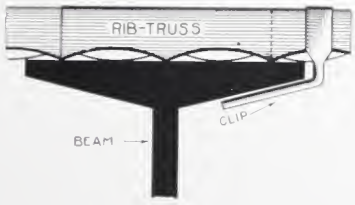


Fig. 6. Method of Fastening to I Beam by Special Clip

LAYING IMPROVED RIB-TRUS ROOFING PLATES

Continued

at one point. This method of laying the plates makes them more even and close. (See Fig. 5.)

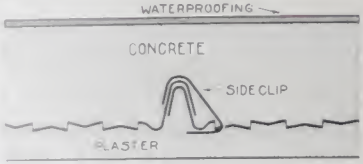


Fig. 7 Showing Side Clip in Complete Roof Construction

Special clips are furnished when ordered for fastening plates to purlins or beams as well as for fastening sides of plates together between bearings. Two side clips should be used for ordinary spans. These prevent the edges of plates from separating while concrete is being put on and at the same time stiffen the plates and the whole construction.

Roof Construction Showing Manner of Applying Concrete to RIB-TRUS Plates. The Narrow Spaces are Filled in after Wide Strips of Concrete Have Set

LAYING IMPROVED RIB-TRUS ROOFING PLATES

Continued

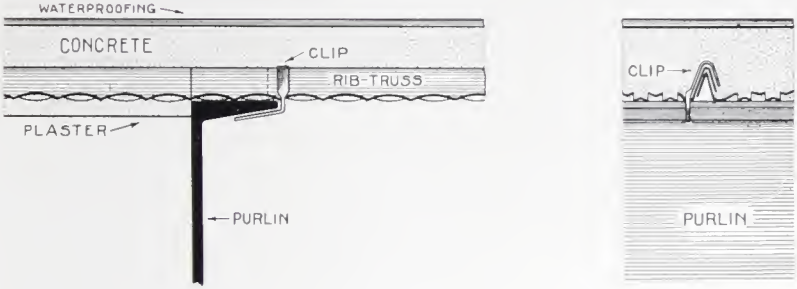


Fig. 8. RIB-TRUS Fastened to Purlin by Special Clip. Plastered Underneath and Concreted and Waterproofed Above

The RIB-TRUS Plates are fastened to the purlins by a special clip which is furnished without extra cost but must be ordered along with the plates. This clip is quickly and easily adjusted, eliminating the use of nuts and bolts and permitting all of the work to be done from the top.

They clamp the plates to the purlin by clinching over the ribs as shown in Figure 8. To insert the clip, punch a hole alongside of the rib at the edge of the purlin. Two purlin clips at each bearing per width of Plate 24 inches wide are sufficient.

Usually the plates lap directly over a purlin, the use of a single clip through top plate firmly holding both plates. (This fact may also be noted in Figure 8.)

The corrugations or ribs of the second row of sheets should be lapped over those of the first row, allowing an end lap of at least 2 inches.

As the ribs are made of a uniform depth throughout their length the end lap is quickly made and permits a snug fit.

IMPROVED RIB-TRUS ROOFING DETAILS

Fig. 9. Method of Finishing Against Adjoining Walls

Fig. 9 shows the easiest and most efficient method of finishing against an adjoining or parapet wall. The pitch necessary to drain the water is made by diminishing the thickness of concrete in the direction of the drain, or by the pitch of the roof itself.

Fig. 10. Showing Permanent Gutter Construction

Fig. 10 shows a permanent gutter construction. The gutter is fastened by rivets directly to the RIB-TRUS Plates or by bolts set in concrete so that the gutter may be hung later.

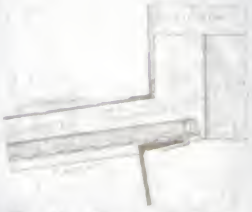


Fig. 11. Showing Curb Construction

Fig. 11 illustrates the most successful methods of providing curbs for ventilators, skylights, etc.

CONCRETING AN IMPROVED RIB-TRUS ROOF

Take one part Portland cement and two parts clean, sharp sand and four parts crushed stone or gravel and mix dry, thoroughly. Then add water and mix thoroughly to the consistency of thick mortar.

Apply to a depth of at least ¼ inch above the top of the ribs and work well so that there will be no voids and so that each loop will be completely filled. Then smooth the surface to a uniform level with straight edge or float.

When the concrete is thus applied to the plates it engages the loops in such a manner as to form a perfect lock and is absolutely bonded after the concrete hardens.

But the concrete must set gradually and great care should be exercised to this end. In hot weather it should be protected from the sun's rays by use of damp tarpaulins, old carpet or straw, and kept wet for several days; otherwise the concrete will dry out before it is properly set, or hardened, and become brittle and crumble.

The Taylor-Boggis Foundry Co., Cleveland, O.

WATERPROOFING AN IMPROVED RIB-TRUS ROOF

The waterproofing of a concrete roof may be accomplished by including in the concrete any reliable waterproofing material which, when mixed properly with the concrete, will make it impervious.

However, a concrete roof to be reliably water-tight should be covered with some good composition or felt roofing material. This may be applied directly to the concrete with hot pitch—in usual manner.

All butt edges or ends at walls, chimneys, skylights, or elsewhere should be well protected by metal flashing.

The Taylor-Boggis Foundry Co., Cleveland, O.

PLASTERING IMPROVED RIB-TRUS

After the concrete on the top of the plate has hardened make a cement plaster composed of one part of good Portland Cement to two parts of clean, sharp sand, and with this mixture add two-fifths part of hydrated lime and sufficient hair. (The mixture of hydrated lime and hair is composed of four pounds of hair to five sacks of lime and should be made up in form of putty and allowed to stand from two to three days.) This mixture of sand, cement, hair, and hydrated lime should be gauged in a box as used, the proper proportion being easily determined by the plasterer. The amount necessary will vary somewhat according to conditions.

The Taylor-Boggis Foundry Co., Cleveland, O.

The plaster should be thoroughly worked up into the ribs and between the loops so that the steel will be completely coated and so that there is at least three-eighths of an inch of plaster on the under side of the plate. It is very important that the under side of the plates be plastered as all chance of corrosion is thereby eliminated.

IMPROVED RIB-TRUS WALLS AND SIDING

RIB-TRUS is a most economical material for enclosing steel, frame and other buildings, as the plates, cement, and plaster may be applied in a quick and economical manner.

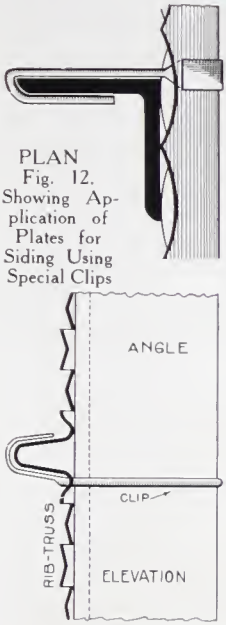
Factory buildings, as well as all kinds of commercial plants, are giving preference to Improved RIB-TRUS in order to secure a permanent wall, thereby avoiding the losses and inconvenience of constant repairs.

Best results are secured by use of a concrete curtain wall, the RIB-TRUS Plates being carried by means of angles or similar members attached to the columns supporting the roof.

Hollow walls are provided when desired by using two layers of RIB-TRUS, leaving an air space between.

One Inch, No. 28-Gauge RIB-TRUS Plate on Sides of Monitor
M. J. Whithall Coal Pocket, Worcester, Mass.
Adolph Suck, Engineer, Hyde Park, Mass.
E. K. Watson Co., Contractors, Warren, R. I.

IMPROVED RIB-TRUS WALLS AND SIDING—*Continued*



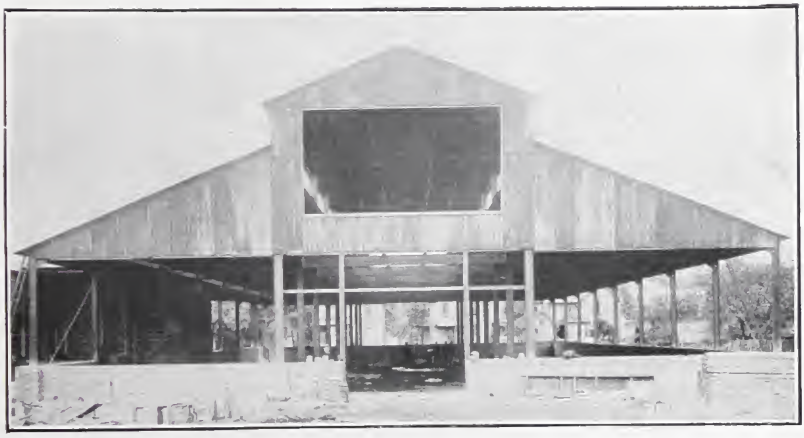
PLAN
Fig. 12.
Showing Application of Plates for Siding Using Special Clips

For siding construction the plates may be fastened to the frame-work with the ribs running vertically or horizontally as desired. Steel frame must be prepared accordingly.

These plates are securely fastened by means of the special clip which clinches over the rib of the plate and clamps it to the channel, I beam, or angle as shown in Fig. 12.

The application of RIB-TRUS Plates for concrete siding is especially adapted to elevator work, cotton warehouses, tobacco warehouses, train sheds, factory buildings, and for any fireproof building where a light and strong roof, floor, partition or side wall is desired.

For this purpose the plates are usually furnished in No. 24 or 26 gauge material.



Union Metal Manufacturing Co. Bldg., Showing Method of Applying RIB-TRUS for Ends of Buildings for Stucco or Plastered Finish

IMPROVED RIB-TRUS PARTITIONS

RIB-TRUS for solid partitions meets with great favor for the reason that it is easy to construct. The ribs take the place of the studs, and as they are a part of the plate they make a stronger and firmer ground to plaster on than individual studs and lath. The plates are held at the top by especially made channels, and at the bottom by angles, and the sides of the plates are firmly held together by "side clips." These clips should be applied not more than two feet apart.

Fig. 13

With RIB-TRUS Plates a solid partition 1¾ inches thick may be constructed, thereby saving much valuable space in a modern sky-scraper.

Fig. 14

Top Channel and Bottom Angle Used in Fastening RIB-TRUS Plates for Partitions

Improved RIB-TRUS partitions are fireproof in the true sense of the word, as they are not affected by fire and water, as demonstrated by San Francisco fire, and will stand up and prevent flames from spreading. It was demonstrated by the San Francisco fire that block partitions will *not* stand up against fire and water. The blocks are scattered all over the floors by the water from the hose and the air pressure occasioned by extreme temperature changes during a fire.

Before plastering on RIB-TRUS Plates for partitions or side walls over 6 feet high the plates should be braced in their middle distance between top and bottom on Rib side until first coat of plaster has set, when bracing may be removed and Rib side of plates plastered. Plaster should cover ribs at least ¼ inch.

RIB-TRUS partitions are sound-proof and vermin-proof, and make a saving in labor, material and floor space as well as trim.

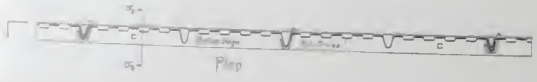


Fig. 15

Sectional Elevation-RR

Fig. 16

Plan and Elevation of RIB-TRUS Plates for Partitions

IMPROVED RIB-TRUS SUSPENDED CEILINGS

Theatre Building, 12th St., and Passquick Ave., Philadelphia, Pa.
RIB-TRUS Suspended Ceilings
Gardiner, Hopkins & Milgram
Owners and Builders
Architects, Anderson & Haupt

RIB-TRUS for suspended ceilings is unsurpassed, especially where the supports are several feet apart.

The ribs are turned up with the flat surface of lath down—the ribs acting as beams to stiffen the plate and carry the plaster over large areas without extra support.

Fig. 17 shows a type of flat arch construction with RIB-TRUS attached to the lower flange of the beams, forming a flat suspended ceiling.

Size of Rib.	Gauge.	Safe Span in Feet for RIB-TRUS Used as Suspended Ceiling, ¾" of Plaster Applied.					
1"	24 26 27			3' 10½"		4' 10½"	5' 10½"
¾"	24 26 27		3' 4½"		4' 4½"	4' 10½"	
½"	24 26 27	2' 4½"	3' 4½"	3' 10½"			

The plates are firmly held by special clips to the beams or hangers, and the plaster is applied directly upon the under side of the plates, which gives an even and rigid surface for receiving the plaster, effecting a great saving over expanded metal in amount of plaster used.

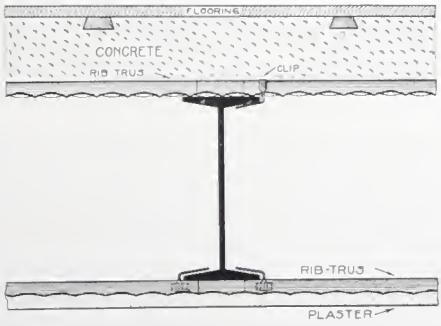


Fig. 17. Flat Arch Floor Construction with Flat Furred Ceiling

IMPROVED RIB-TRUS FOR FLOOR CONSTRUCTION

RIB-TRUS is adaptable to floor construction for flat arches as well as curved.

For flat arches the RIB-TRUS Plates are usually laid on top of beams, giving plates 3 inches of lap at the ends, after which they are clipped to the flange of beams by special clips.

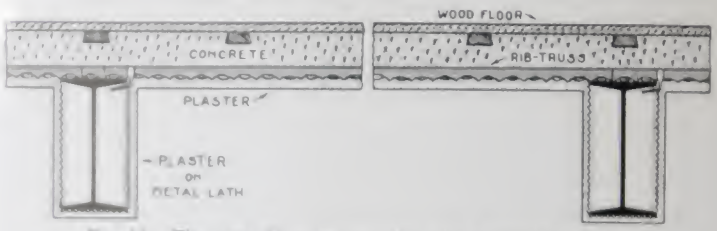


Fig. 18. Flat Arch Floor Construction with Suspended Ceiling

Where spans are more than 4 or 5 feet in length it is usually necessary to place one support under the middle of the plate between the beams to prevent sagging while soft concrete is being applied.

The thickness of concrete varies with the length of span and load to be carried, more being required for floors than for roof construction because of the heavier load that is to be carried.

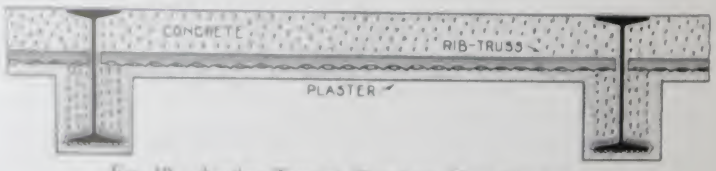


Fig. 19. Another Type of Flat Arch Floor Construction

For a flat arch construction, floors similar to those shown in Figs. 18 and 19 present fireproof constructions in which the under side of the plate is plastered and the beams protected by furring with cement plaster and metal lath. The metal lath is formed around the beam as shown and attached to the RIB-TRUS.

IMPROVED RIB-TRUS FOR FLOOR CONSTRUCTION

Continued

RIB-TRUS Plates, curved for segmental arch construction, are intended for floors where heavy loads are to be carried. They are stronger than ordinary curved corrugated sheets and permit of a much handsomer finish on the under side, or ceiling, as plates are plastered and surface may be decorated.

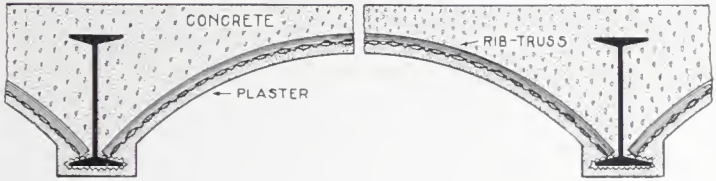


Fig. 20

Where curved arches are desired the RIB-TRUS Plates are curved to the required radius, giving the desired rise of arch and permitting the ends of the plates to rest on the lower flanges of the beam. As plates must be sprung to place, ¾-inch ribs are the highest that should be used for this class of work. (See Figs. 20 and 21.)

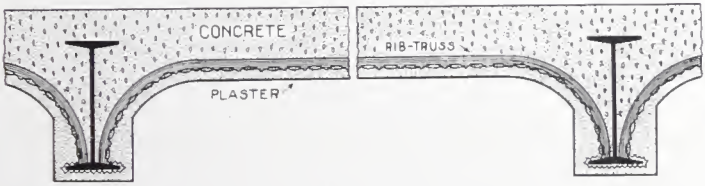


Fig. 21

In filling in concrete over Improved RIB-TRUS for curved arches commence by first filling in the center of the arch and fill toward the haunches. This method prevents the plates from bulging or buckling.

If the haunches are filled first the ends of the plates may be forced from the beams or become displaced.

In designing floors, using RIB-TRUS Steel Plates, consult table of safe loads and data on page 30.

IMPROVED RIB-TRUS WITH STUCCO FINISH

Improved RIB-TRUS is particularly recommended for use on houses and buildings where stucco finish is desired. The ribs act as furring and also strengthen the entire structure. Half-inch rib plates are best adapted for this work.

They are applied directly to the studs in a horizontal position, or vertically over sheathing as conditions allow.

If sheathing is not used the RIB-TRUS can be back-plastered, a very important feature. The back plaster should be carried in between the studs at least ½ inch—thereby stiffening the whole structure.

RIB-TRUS at a little expense makes the old house new. It makes it cooler in the summer and warmer in the winter, and the artistic effects that may be obtained are truly remarkable.

RIB-TRUS is especially well adapted for foundation for stucco, no sheathing being required when RIB-TRUS is used.

The wood studs should be spaced on centers not to exceed 24 inches—16 inches being preferable, after studs have been thoroughly braced so as to take up the wind pressure.

Our ½ Rib material should be applied, commencing at the top, the rib side of the plate being turned in against the studs, and the flat side of sheet out, so as to give a uniform surface for the plaster. If ribs were turned out they might show through the plaster.

Fasten the plates to the studs horizontally, using 1½-inch staples, which should be driven through plate astride of the rib. Use not less than four staples to each sheet and drive them down tightly.

After the plates have been properly fastened the first coat of plaster should be applied on the outside. Mortar to be mixed as follows: One part Portland Cement, two parts clean, sharp sand and one-fourth part lime putty with sufficient cow's hair therein. The

IMPROVED RIB-TRUS WITH STUCCO FINISH—*Continued*

Portland Cement and sand should be mixed thoroughly, dry; after which add sufficient water to make mortar of proper consistency, then add the one-fourth part lime putty and hair and mix until lime is uniformly blended with the cement and apply to the outside of RIB-TRUS Plates. This coat should be at least ½ inch thick over plates, and should be thoroughly scratched so that the second coat will firmly adhere. This is a very important feature.

The second coat should be applied just as soon as the first coat will permit so that the first and second coats will properly bond. After the second coat has set the rough coat or pebble-dash finish should be applied. Care should be taken when putting on casings, paneling, etc., to have them set out at least 1½ inch from face of RIB-TRUS so as to produce proper panel effect; otherwise the plaster will finish flush with the casings and not give the proper effect.

Casings and paneling boards should be rabbeted on their edges equal to one-half thickness of member ¾ inch back so as to allow the plaster to make water break to keep weather out. Waterproofing material should be used in second and last coat to prevent rain from soaking into plastered surface.

The inside or clinch side of RIB-TRUS Plates should be plastered, covering the ½-inch ribs at least ½ inch. This brings the plaster slab in between the stud, stiffening the whole structure and preventing any possibility of plates corroding.

Patent plaster contains sulphuric acid and when moisture is present will attack and corrode metal, hence it should not be used on Metal Lath or RIB-TRUS for outside work, but Portland Cement and lime will protect the metal against corrosion.

TABLE OF SAFE LOADS FOR IMPROVED RIB-TRUS

Thickness of Slab Above Plate.	Gauge of Metal.	Height of Rib.	Span in Feet. 3	4	5	6	7	8
1″	24	¾″	130	93	70			
Wt. 12 lbs. per sq. ft.....	26	¾″	95	70	30			
1½″	24	1″	175	126	93	65		
Wt. 18 lbs. per sq. ft.....	26	1″	125	93	68	50		
2″	24	1″	250	190	120	95	50	
Wt. 24 lbs. per sq. ft.....	26	1″	195	160	100	65	35	
3″	24	1″	400	327	209	137	104	80
Wt. 36 lbs. per sq. ft.....	26	1″	325	250	175	132	99	56
4″	24	1″	690	499	307	238	188	138
Wt. 48 lbs. per sq. ft.....	26	1″	560	380	234	169	120	88

Weights given are for dead and live loads.

It must be understood that thin concrete slabs such as are used for roof work do not develop the full tensile strength of the RIB-TRUS Plates. However, a surplus of metal is a good thing and gives additional security.

PROPERTIES OF BERGER'S IMPROVED RIB-TRUS

Depth, Rib, Inches.	Gauge, U. S. Standard.	Weight, Per 100 Sq. Ft.	Cross Sectional Area Per Foot Width, not Including Side Lap.
½	28	73 lbs.	.21875 sq. in.
	27	81 "	.240625 "
	26	88 "	.2625 "
	24	117 "	.35 "
¾	28	78 "	.234375 "
	27	86 "	.2578125 "
	26	94 "	.28125 "
	24	125 "	.375 "
1	28	83 "	.25 "
	27	92 "	.275 "
	26	100 "	.3 "
	24	133 "	.4 "

MAXIMUM SPAN FOR IMPROVED RIB-TRUS AS CENTERING

To Support Various Thicknesses of Wet Concrete. For Greater Spans Use Temporary Supports

Size of Rib.	Gauge.	Thickness of Slab. 1"	1½"	2"	2½"	3"	3½"	4"	4½"	5"
1"	24		5′ 0″	4′ 6″	4′ 2″	4′ 0″	3′ 8″	3′ 6″	3′ 2″	3′ 0″
	26		5′ 0″	4′ 0″	3′ 6″	3′ 0″	2′ 9″	2′ 6″		
¾"	24	5′ 0″	4′ 6″	4′ 0″	3′ 6″	3′ 0″	2′ 9″	2′ 6″		
	26	4′ 6″	4′ 0″	3′ 6″	3′ 0″	2′ 6″				

Deflection not greater than ¼".

SPECIFICATIONS FOR LAYING IMPROVED RIB-TRUS ROOF

LAYING PLATES.—The RIB-TRUS Plates should be properly fastened to the purlins or beams by use of special clips. Starting at the eaves or lowest part of the roof the lower end of first row of plates should be fastened. The upper end will be held by lapping the second row over the first about two or three inches. In starting second row split a sheet and start with a half sheet so as to prevent four thicknesses of metal over-lapping at one point. Fasten the lower ends of the second sheets which hold the upper end of the first row, and keep on in this manner until the last row is laid when both ends should be fastened.

To fasten sheets by use of special purlin clip punch a hole close to rib at edge of purlin; insert the round end of clip and pass it down under flange of purlin or beam, after which clinch the flat end over the rib of plates. The clinch should be pressed down tight with a pair of pliers (see page 15).

To fasten side edges of sheets use the special side clip and insert the bent end into the open mesh next to rib and clinch the long end over the rib of plate. For four or five-foot spans use two side clips.

CONCRETING.—After RIB-TRUS Plates have been laid as directed apply concrete mixed as follows: One part Portland Cement and four parts clean, washed gravel or crushed stone. When crushed stone is used two parts clean, sharp sand should be used to fill up voids. Good furnace cinders may be used if properly screened and mixed as follows: One part cement, two parts sand and three parts cinders. The mixture must be made like thin mortar as cinders absorb the water. In applying the concrete to the plates care should be taken not to dump the cement from the wheelbarrow directly on the plates as the impact may deflect the plates and make trouble. If wheelbarrows are used dump them on a platform and shovel the concrete to place. It is always best to dump the concrete from buckets or from shovels directly over the bearings and work it to center of span with trowel, and not dump on center of plate.

If proper care is exercised no trouble need occur on account of plates deflecting, the work progressing without delay. (See table of spans that may be used without supports. Page 30.) Longer spans must be supported midway between bearings.

SPECIFICATIONS FOR LAYING IMPROVED RIB-TRUS ROOF—*Continued*

The concrete can be rodded off on grounds of proper thickness laid on the RIB-TRUS Plates, after which the surface should be troweled smooth to receive waterproofing but not until the concrete has become dry.

Great care should be taken to prevent the concrete from drying out too rapidly in hot weather. It should be kept damp by covering with wet tarpaulins, old carpet or hay, or wet with hose several times per day after concrete has partly set.

PLASTERING.—After the concrete has hardened on top of RIB-TRUS Plates the plates should be plastered on the under side with plaster made as follows: One part Portland Cement, two parts clean, sharp sand and about one-fourth part lime. Putty containing good cow's hair—hydrated lime is best. If slaked lime is used it should stand several days before being used so that it may cure. One good coat is sufficient to cover the plates on the under side. It should be darbied off level or floated as desired. In no case should the plates be left without being plastered on the under side.

FLOORS

FLAT ARCH.—The plates should be clipped down to the flanges of beams and lapped at least two inches. After plates have been laid put in the concrete, mixing same as for roof, and taking care to support the plates where longer spans and more concrete are required than given in table, page 30.

Floor slabs usually require more concrete over plates to develop their tensile value than roofs, therefore, plates usually need to be supported in the middle until concrete has hardened when the support may be removed. The plates should then be plastered on the under side same as for roof, excepting that more than one coat may be needed to produce desired finish.

CURVED FLOOR ARCHES.—RIB-TRUS can be curved to any desired radius for floors. Specifications should give length of span and rise or curvature of plates measured at center of arch.

In setting the plates care should be taken to fasten the side laps of the sheets; otherwise they will separate when the soft concrete is applied. Clips are furnished without charge for this purpose, but should be ordered with the plates.

After plates have been set concrete should be applied. (Mix same as for flat arches.)

SPECIFICATIONS FOR LAYING IMPROVED RIB-TRUS ROOF—*Continued*

Care should be taken in placing soft concrete on plates. Commence in middle of span or crown of plate and work both ways, filling in the haunches last. This keeps the plates balanced and prevents the ends of plates from being shoved off the flanges of beams or buckling, as is likely to occur if the haunches of arch are filled in first. After concrete has been filled in to proper level (which should ordinarily be three or four inches) over the crown of the arch it should be rodded off true and level.

SIDING

Improved RIB-TRUS for siding or curtain walls can be applied either horizontally or vertically as conditions demand; usually sheets are applied vertically and are clipped to cross rails or members between columns. These clips are very easily adjusted (see page 23).

After plates are applied they should be plastered with cement plaster as follows: One part Portland Cement, two parts clean, sharp sand and one-half part lime putty with good cow's hair therein. Hydrated lime is the best.

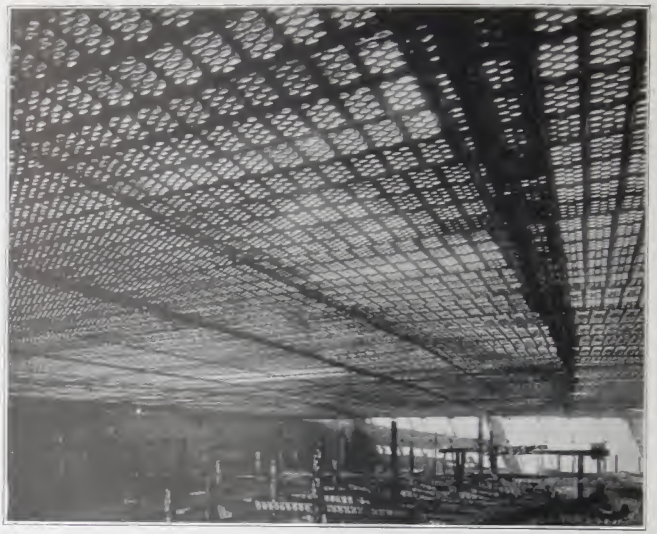
If slaked lime is used it should stand several days before being applied. The first coat should be as heavy as can be applied so as to fill in level with the ribs if possible. This coat should be thoroughly scratched so that second coat will adhere thoroughly.

The second coat should be applied just as soon as first coat is sufficiently set to permit working over it. This insures a better bond than it would if the first coat were allowed to dry out. Waterproofing compound should be used in the mortar.

The second coat is usually the last for factory or similar buildings and should be floated off smooth and level. A rough cast or pebble dash may be had if desired.

The inside should be finished in similar manner as outside except that the surface should always be smooth.

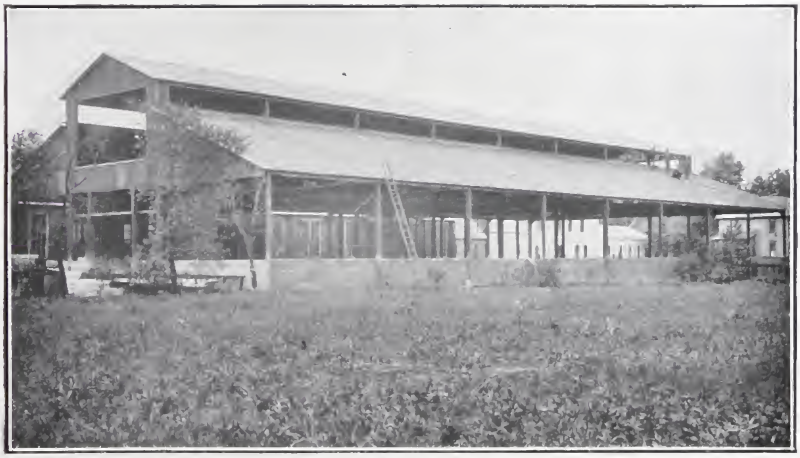
The Taylor-Boggis Foundry Co., Cleveland, O.
(Three Views)



Suspended Ceiling—RIB-TRUS
Theatre Building, 12th St. and Passquick Ave.
Philadelphia, Pa.

The Taylor-Boggis Foundry Co., Cleveland, Ohio
107,000 Feet Toncan Metal RIB-TRUS Used
Contractors, John Gell & Son, Cleveland, Ohio
Architects, Cleveland Engineering Co., Cleveland, Ohio

Knight Tire and Rubber Co., Canton, O.
Interior View Showing Plastered Ceiling
Architects, Harpster & Bliss, Akron, O.
Contractors, Melbourne Bros.



Union Metal Manufacturing Co. Building Showing RIB-TRUS Roof

Knight Tire & Rubber Co., Canton, Ohio

Jackson Livery Stable, Akron, Ohio
Architects, Haglock & Potter, Akron, Ohio
RIB-TRUS Used for Roof Construction

BERGER'S

Patented

Ferro-Lithic

Plates

for

Reinforced Concrete Construction

of

Roofs, Floors
Sidings

Etc., Etc.

INDEX

BERGER'S *Ferro-Lithic* PLATES

GENERAL DESCRIPTION

FERRO-LITHIC Steel Plates are plates whose cross-section shows a continued series of alternate dove-tails as shown in Fig. 1. Because of this shape it is possible to concrete and plaster directly upon the steel plate in the manner shown in Fig. 2.

Cross-Section

Fig. 1
FERRO-LITHIC Plate Ready to Lay

The constant demand for light weight and consequent low dead load in concrete construction was a reason for the FERRO-LITHIC Interlocking System of Concrete Reinforcement.

Demand

FERRO-LITHIC Steel Plates were originally designed for combined centering and reinforcing of concrete to meet the demand for a permanent, fire-proof concrete roof.

History

The application of these plates has been extended into other fields and they are now extensively used for centering and reinforcing of concrete slabs for flat and arched floors, for sidings of buildings, bridges, lining of coal bunkers, sidewalk construction, etc. They are applicable to either reinforced concrete frames or structural steel frames, the better application being to the structural steel framing.

Extension

Fig. 2.
FERRO-LITHIC Plate Concreted on Top, Plastered Underneath

Uses

The FERRO-LITHIC Interlocking System of concrete slabs for roofs, floors, sides, etc., is especially suitable for buildings exposed to smoke, acid fumes, gases, condensation or moisture; such as found in various manufacturing plants, chemical works, collieries, rolling mills, galvanizing plants, plating works, foundries, power houses, train sheds, breweries, round houses, etc.

Centering

By reason of the continued row of dove-tails in cross section the plate serves both as centering and reinforcing, as the bare plate itself is sufficiently rigid to support the concrete (see Fig. 1), and the dove-tails on the top hold the concrete in place while the dove-tails on the under side of the plate

and

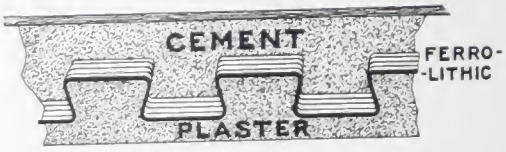


Fig. 3. Cross Section of Completed Roof Slab

Reinforcing

hold the plaster (see Figs. 2 and 3). No centering other than the plate itself is necessary, but it is well to brace the plate, usually at the center of the span, while the concrete is being installed and until same is thoroughly set.

PLATE STANDARDS

Depths Gauges

FERRO-LITHIC Steel Plates are made of gauges 22, 24 and 26, and depths of ½, ⅝ and ¾ inches. The standard plate is the No. 24 gauge plain, unpainted with dove-tails ½-inch deep.

Widths

The effective covering width of the ½-inch depth plate is 20 inches; of the ⅝-inch depth, 18 inches; and of the ¾-inch depth, 16½ inches.

All depths and gauges can be furnished in any length up to and including 12 feet, and can be furnished cut to size or formed into special shape. They can be curved for segmental arch construction in No. 24 gauge and depths of 1/2 and 5/8 inch, and no other size or gauge can be curved.

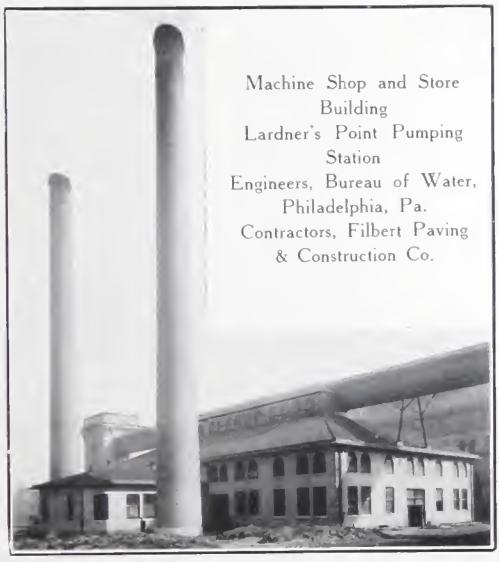
Lengths

Curving

MECHANICAL BOND

For perfection of mechanical bond the lateral dovetailed corrugations are heavily cross ribbed at close intervals at right angles to their long axis. This roughens the surface and makes absolutely certain a concrete adhesion or bond between the concrete and steel. The tapered sides of the keystone or dove-tail members make a positive clinch for the concrete and plaster, and further assist the mechanical bond; also provide additional strength to the plate because of their nearly vertical position.

Cross Ribbed



Machine Shop and Store Building
Lardner's Point Pumping Station
Engineers, Bureau of Water, Philadelphia, Pa.
Contractors, Filbert Paving & Construction Co.

Ferro-Lithic PLATES

FOR FIRE-PROOF, ACID-PROOF, TIME-PROOF ROOFS

FIRST COST—FINAL COST

Roof

On account of the location of roof trusses, often high above the ground, it is an exceedingly difficult matter to erect centering for a concrete slab to be reinforced with rods, expanded metal, etc. In contrast, the application of FERRO-LITHIC Plate is made directly upon the roof framing with purlins spaced at proper intervals.

Centering

Purlin Spacing

The most desirable spacing of purlins is at centers of 4 feet 10½ inches so as to provide for the use of a 10-foot sheet and a lap of three inches at the end of the plate. The plates are placed into position and securely anchored to the framing, and if weather is unsuitable for concreting the plates may be applied and the concreting and plastering completed at a later, more convenient date.

Weight

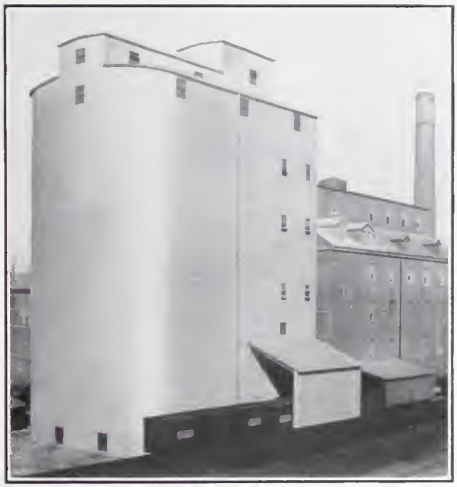
The Standard FERRO-LITHIC Roof Slab weighs approximately 16 pounds per square foot, concreted, plastered and water-proofed.

The application of these plates for concrete roof construction is explained in detail in this catalog beginning at page 16.

Ferro-Lithic FOR SIDING CONSTRUCTION

Application

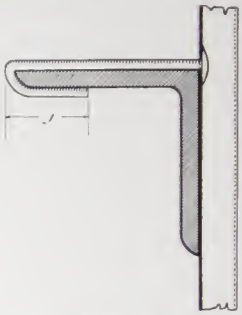
For sidings the plates can be placed with the dovetails running either vertically or horizontally or on the incline. They may be placed into position on the building and allowed to remain for some time without plastering and concreting, a feature quite desirable when the difficulty of concrete construction in bad weather is considered.



Elevator American Hominy Co., Indianapolis, Ind.
Macdonald Engineering Co., Chicago, Engineers and Contractors
FERRO-LITHIC Plates for Cupola Siding

Construction

The application of FERRO-LITHIC Plates for sidings of buildings is made directly upon the framing and may be used with the "V" Strip (see Fig. 8) for locating the plate far enough away from the framing to provide space for interior plaster. This "V" Strip may be omitted and the plates applied to the framing with a direct bearing upon the structural steel.



Fastened with
No. 10 Special Nail

Fastening

In either case the plates are applied either with the beam clip (Figs. 11 and 12), or by means of special nails applied in the manner shown on Fig. 4.

Class of Buildings

The application of FERRO-LITHIC Plates for concrete siding is especially adapted to elevator work around the cupola. The plates are also used extensively for tobacco warehouses, train sheds, factory buildings, and in fact, for any fire-proof building where it is desired to have a light weight non-supporting partition or wall.

For this purpose the plates are frequently furnished in No. 26 gauge material.

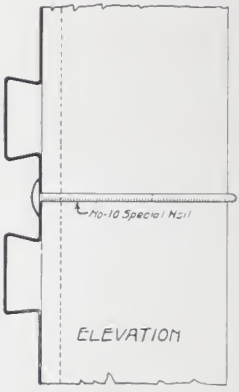


Fig. 4
Showing Application of Plates for Siding
Using Special Nails

Structural Shop, The Morgan Engineering Co., Alliance, O.
FERRO-LITHIC Plates Used for Siding

Ferro-Lithic FOR FLOOR CONSTRUCTION

For the flat arch construction a floor similar to that shown in Fig. 5 presents a fireproof construction in which the underside of plates is plastered and the beams protected by a shield of cement plaster and metal lath. The metal lath is formed around the beam as shown and attached to the FERRO-LITHIC with a prong clip punched in the plate. Flat Arch

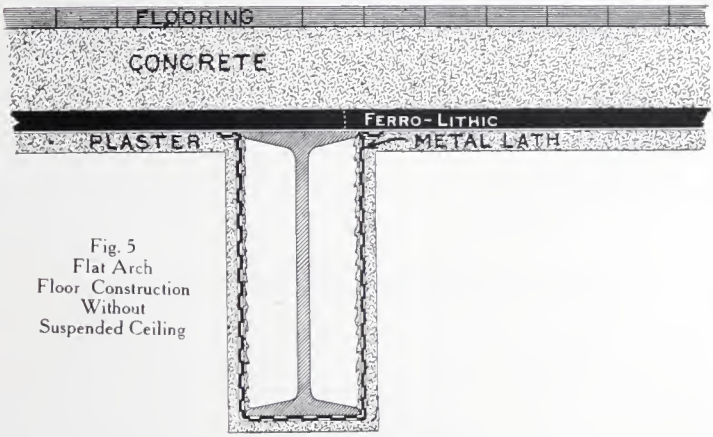


Fig. 5
Flat Arch
Floor Construction
Without
Suspended Ceiling

Fig. 6 shows another type of flat arch construction with Berger's Prong Lock Furring attached to lower flange of beams, making flat suspended ceiling. The lath is placed into position on the furring and held securely by clinching prongs which project from the furring. This prepares an even, rigid ground upon which to plaster. Flat Arch Furred

When FERRO-LITHIC Steel Plates are used for flat floors they are placed with direct bearings upon the beams, omitting "V" Strips and Stay Clips. They are attached with standard floor beam clips. Fastening

Plastering

FERRO-LITHIC Plates ½-inch 24 gauge curved for segmental arch construction (Fig. 7) are stronger than ordinary curved corrugated sheets, and permit of a much handsomer finish on the under side or ceiling, as they can be plastered and decorated. This construction is very strong and is particularly adaptable to heavy duty floors.

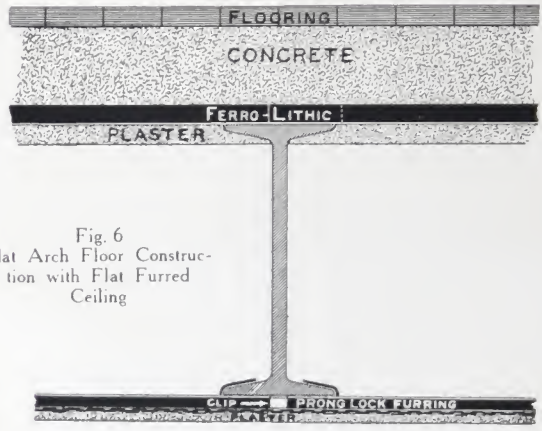


Fig. 6
Flat Arch Floor Construction with Flat Furred Ceiling

Floor construction using FERRO-LITHIC Steel Plates can proceed on all floors of buildings at the same time, thus expediting the work.

In designing floors using FERRO-LITHIC Steel Plates load table on page 50 and data on page 54 should be consulted.

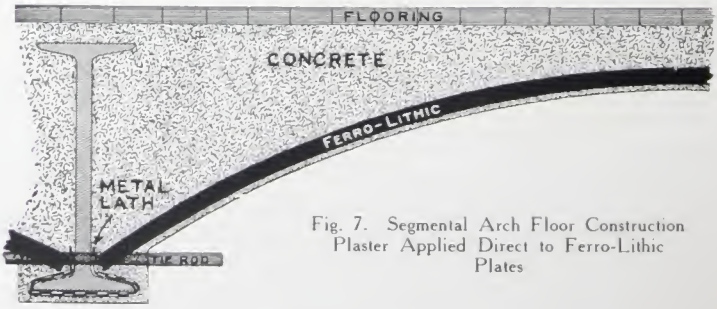
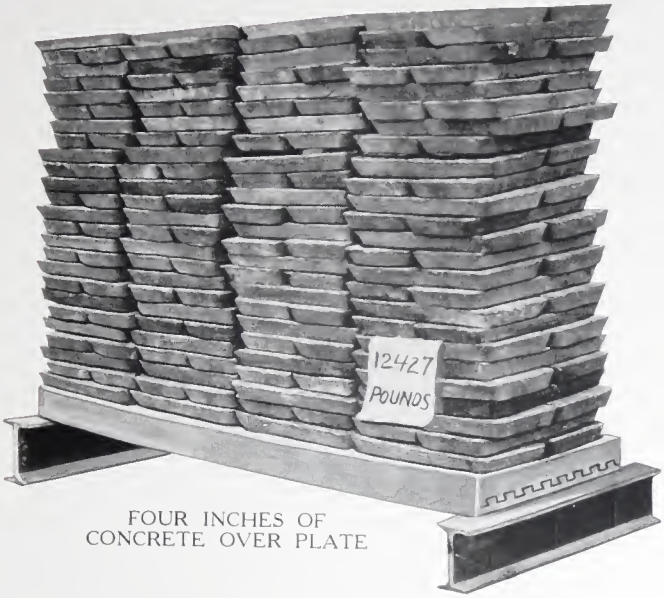


Fig. 7. Segmental Arch Floor Construction Plaster Applied Direct to Ferro-Lithic Plates



FOUR INCHES OF
CONCRETE OVER PLATE

The above test was made upon one No. 24 gauge FERRO-LITHIC Plate, ½ inch depth of corrugation, 20 inches wide. Clear span, 6 feet 0 inches. Covered with a 1-2-4 mixture of concrete 4 inches above top of corrugation and plastered on underside ⅜ inch below corrugation. The cement was one month old when the test was made. The deflection was measured at every 1000 pounds increase in load and was found to be of equal variation. Maximum deflection was ¼ inch.

ONE-HALF INCH OF
CONCRETE OVER PLATE

The above test was made upon one No. 24 gauge FERRO-LITHIC Plate, ½ inch depth of corrugation, 20 inches wide. Clear span, 6 feet 0 inches. Covered with a 1-2-4 mixture of concrete ½ inch above top of corrugation and plastered on under side ⅜ inch below corrugation. The cement was one month old when test was made. The deflection was measured by a lever with a 3 to 1 arm and was recorded at every 100 pounds increase of load, and was found to be of comparatively even variation, a maximum deflection of ⅞ inch being reached.

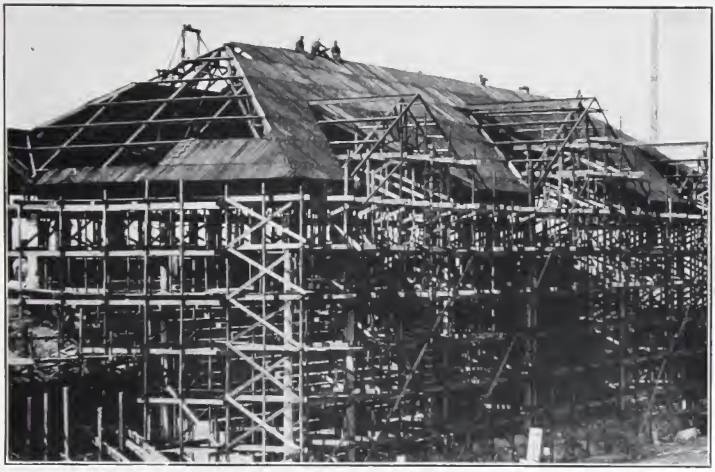
TABLE OF SAFE LIVE LOAD

FACTOR OF FOUR

Flat Ferro-Lithic Reinforced Slabs

Clear Span.	DEPTH OF CONCRETE OVER TOP OF PLATES								
	0″	½″	1″	1½′	2″	2½″	3″	3½″	4″
2′-0″	159	415	718	1025	1325	1665	1955	2270	2620
2′-6″	100	265	460	655	848	1065	1250	1455	1680
3′-0″	70	184	319	455	588	738	869	1010	1165
3′-6″	53	138	238	335	438	539	638	741	855
4′-0″	40	105	181	256	335	413	489	568	655
4′-6″	31	84	144	208	269	330	394	458	519
5′-0″	25	68	116	168	218	268	319	370	420
5′-6″	21	54	95	138	179	221	253	305	346
6′-0″	18	45	80	115	150	186	221	256	291
6′-6″	15	38	69	99	129	159	189	219	248
7′-0″	13	33	59	85	111	136	163	189	214
7′-6″	11	29	51	74	95	119	141	164	185
8′-0″	10	25	45	65	84	104	124	144	163
8′-6″	9		40	59	76	93	111	124	144
9′-0″	8			52	68	83	99	113	129
9′-6″	7				60	75	88	101	115
10′-0″	6					68	79	91	104

NOTE:—Loads for ½″ depth and No. 24 gauge only.
Loads per sq. ft. uniformly distributed.
Loads below heavy lines show excessive deflection.
Data of safe loads for other depths and gauges furnished on application.



Laying FERRO-LITHIC Roof Plates at the Syracuse Stadium Grand Stand
Architects, Revels & Hallenbeck, Syracuse, N. Y.
Contractors, Consolidated Engineering & Construction Co.
Syracuse, N. Y., and New York, N. Y.

CONSTRUCTION AT SYRACUSE UNIVERSITY

Grand Stand

Perhaps no university has a more complete and perfect athletic arrangement than Syracuse University at Syracuse, N. Y. The immense Stadium, seating its thousands, is provided at its most central point with a concrete Grand Stand. The roof of this is of FERRO-LITHIC Steel Plate Construction, the waterproofing of concrete being included in the concrete itself. Two views are shown herewith, one illustrating the roofing being applied preparatory for concreting, and the other showing the completed structure.

Gymnasium

Directly adjoining this immense Stadium is the Gymnasium, also having its roof construction of FERRO-LITHIC System. On this roof slab, however, roofing tiles were placed upon the concrete.

Grand Stand, Syracuse University Stadium
Architects, Revels & Hallenbeck
Contractors, Consolidated Engineering & Construction Co.
FERRO-LITHIC for Roof

Gymnasium at Syracuse University
Architects, Revels & Hallenbeck
Contractors, Consolidated Engineering & Construction Co.
FERRO-LITHIC for Roof

Ferro-Lithic

Construction view of Berger FERRO-LITHIC Plate (curved) for segmental arch balcony floor at Oil Engine House of M. Rumley Co., La Porte, Ind.
View of upper side before concreting
O. B. Zimmerman, Mechanical Engineer. E. Burner & Co., Floor Contractors

Showing Test No. 4 during Loading. Total load sustained, 27,550 lbs. Loading transmitted to slab through 8-inch plank across center

RECORD OF TESTS—Ferro-Lithic

ARCH CONSTRUCTION

Curved FERRO-LITHIC Plate Ready to Lay

No. 1

Plates ½ inch deep, No. 24 gauge plain steel.
Span, 5 ft. 8 in. Width, 3 ft. 3 in. Area, 18.42 sq. ft.
Concrete, 1:2:4. Depth over plate at crown, 2 inches.
Rise of arch at crown, 12 inches. Tie rods, 2¾ in. round.
Loaded at center on a plank 8 inches wide.
Total equivalent breaking load per sq. ft. uniformly distributed 2060 pounds.

No. 2

Plates ½ inch deep, No. 24 gauge plain steel.
Span, 7 ft. 7 in. Width, 3 ft. 2½ in. Area, 24.30 sq. ft.
Concrete, 1:2:4. Depth over plate at crown, 2½ in.
Rise of arch at crown, 15 inches. Tie rods, 2¾ in. round.
Loaded at center on a plank 8 inches wide.
Total equivalent breaking load per sq. ft. uniformly distributed 1640 pounds.

No. 3

Plates ½ inch deep, No. 24 gauge plain steel.
Span, 9 ft. 9 in. Width, 3 ft. 2½ in. Area, 31.30 sq. ft.
Concrete 1:2:4. Depth over plate at crown, 1½ in.
Rise of arch at crown, 18 inches. Tie rods, 2¾ in. round.
Loaded at center on a plank 12 inches wide.
Total equivalent breaking load per sq. ft. uniformly distributed 905 pounds.

No. 4

Plates ⅝ inch deep, No. 24 gauge plain steel.
Span, 8 ft. 0 in. Width, 3 ft. 2 in. Area, 25.25 sq. ft.
Concrete, 1:2:4. Depth over plate at crown, 3 inches.
Rise of arch at crown, 15 inches. Tie rods, 2¾ in. round.
Loaded at center on a plank 8 inches wide.
Total equivalent breaking load per sq. ft. uniformly distributed 2190 pounds.

THE LAYING OF A *Ferro-Lithic* ROOF

STANDARD ONE-HALF INCH MATERIAL TO BE CONSIDERED

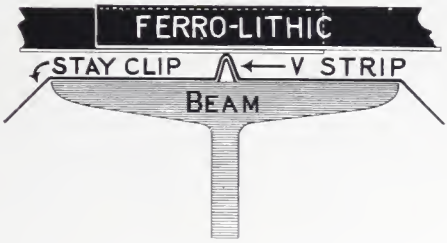


Fig. 8
Showing "V" Strip and Stay Clip

"V" Strips

The framing and purlins being properly located and anchored, start the laying of FERRO-LITHIC Plates by first placing upon the top of purlin, standard "V" Strip. These are located as shown in Fig. 8 and held into place by means of stay clips placed astride and anchored to the purlins at every 3 feet.

Stay Clips

After the "V" Strips are in place, lay a course of plates

Fastening Stay Clip

along the eave, starting with a full width sheet. The sheets are fastened together by means of the latch as shown in

Fig. 9
Showing
Improved Latch

Figures 9 and 10. These latches are placed 2 feet on centers along the length of each plate.

Fig. 10
Showing Improved
Latch in Completed
Roof

Applying FERRO-LITHIC Sheets

METHOD OF FASTENING *Ferro-Lithic* TO PURLIN

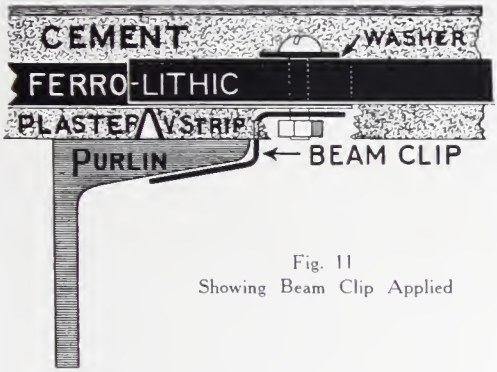


Fig. 11
Showing Beam Clip Applied

Fig. 12
Another View of Beam Clip Applied

Beam Clips

The sheets should be secured to the purlins with standard beam clips spaced 1 foot and 0 inch on centers along the length of the purlins. These clips are bolted to the sheet and secure the plates to the purlins in the manner shown in Figs. 11 and 12. Wherever plates lap over a purlin one beam clip will suffice to secure both plates.

Applying Beam Clip

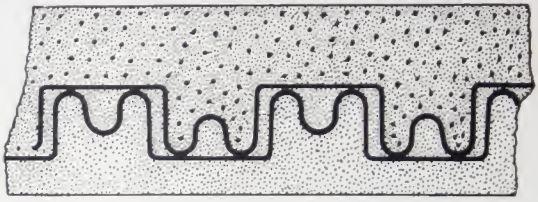


Fig. 13. Section Through End Lap. See also Fig. 16

Breaking Joints

The second row of sheets is started with a half or part sheet so as to break joints at the side lap. The corrugations of the second row of sheets should be inserted into and on the top of those in the front row, making an end lap of at least 3 inches. As the dove-tails are made the same size throughout their length method of the end lap is provided as shown in Figs. 13, 14 and 15.

End Lap

Fig. 14. Showing Method of Making End Lap

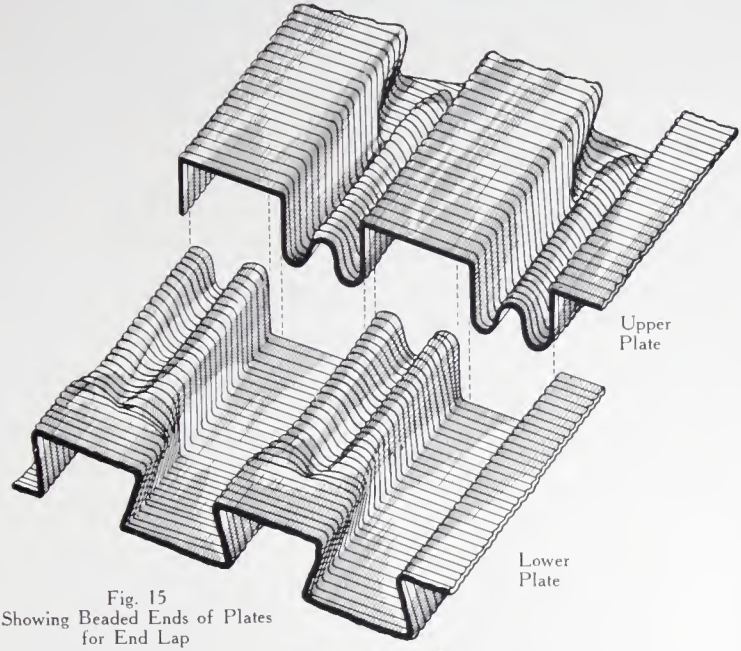


Fig. 15
Showing Beaded Ends of Plates
for End Lap

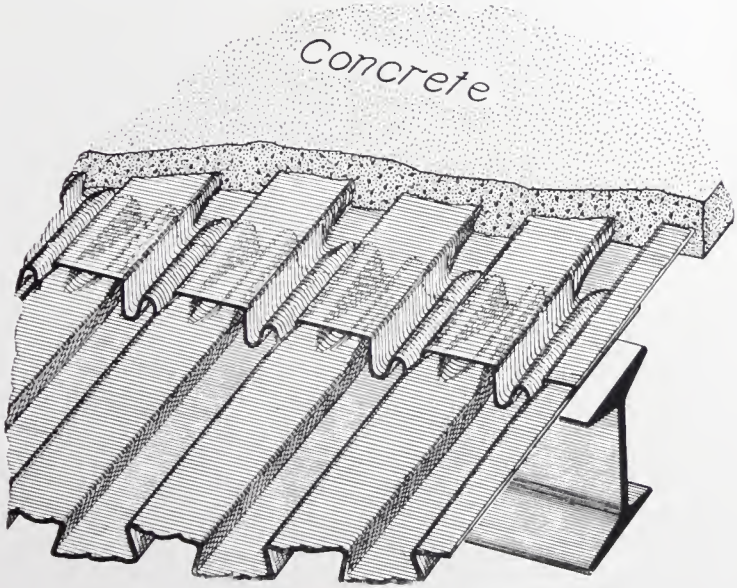


Fig. 16. Method of End Lap—(See also Fig. 13)

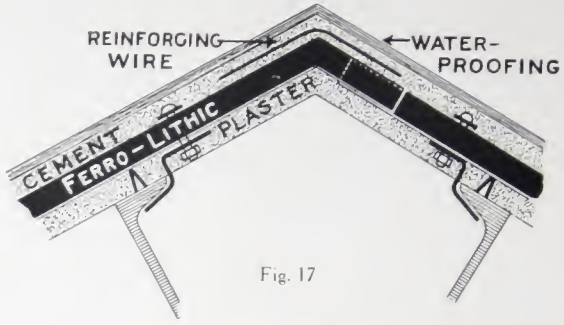


Fig. 17

Showing Construction at Ridge

CONNECTION DETAIL

Ridge Detail

The sheets should be either bent over the ridge or abutted —bending over the ridge being preferable. If it is not possible to bend the plates over the ridge in one piece, or if not desirable to abut them at the ridge, provision may be made as shown in Fig. 17 where one plate is bent and a lap of about 4 inches obtained on one side of ridge, near the other purlin. At this lap the plates should be thoroughly secured together, the best method being to rivet them.

Gutter

The gutter may be erected by means of Berger's Adjustable Hangers as shown in Fig. 18. With this construction it is possible to take down and remove the gutter without in the least disturbing the FERRO-LITHIC Roof.

Fig. 20 shows the top wall and the manner of attaching a gutter at the eaves. The gutter should be bolted to the plates, and in this manner will serve to hold them to a true line. The purlin is set on the rafter or the top chord of truss, and the wall finished

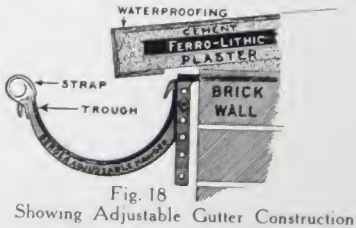


Fig. 18

Showing Adjustable Gutter Construction

up to the roof line, the space between the top of the wall and roof along the purlin being filled with concrete.

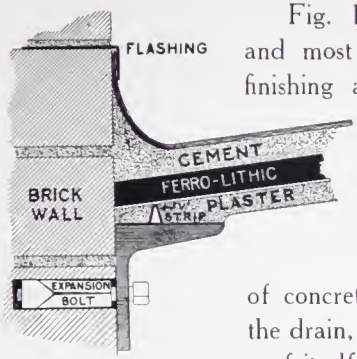


Fig. 19 Method of Finishing Against Adjoining Walls

Fig. 19 shows the easiest and most efficient method of finishing against an adjoining or parapet wall. The pitch necessary to drain the water is made by diminishing the thickness of concrete in the direction of the drain, or by the pitch of the roof itself.

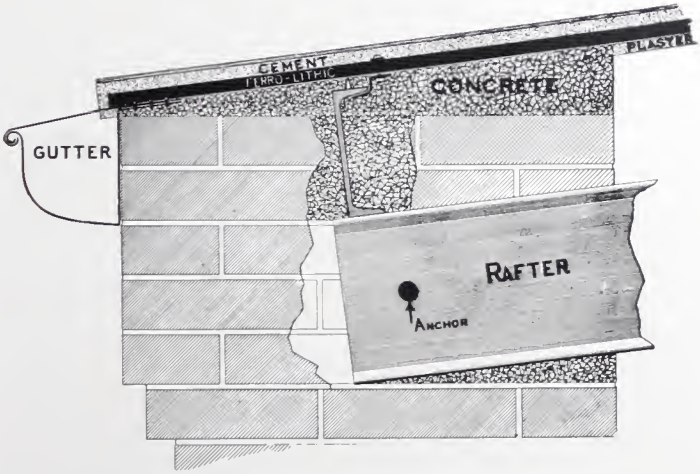


Fig. 20. Showing Permanent Gutter Construction

CONCRETING A *Ferro-Lithic* ROOF

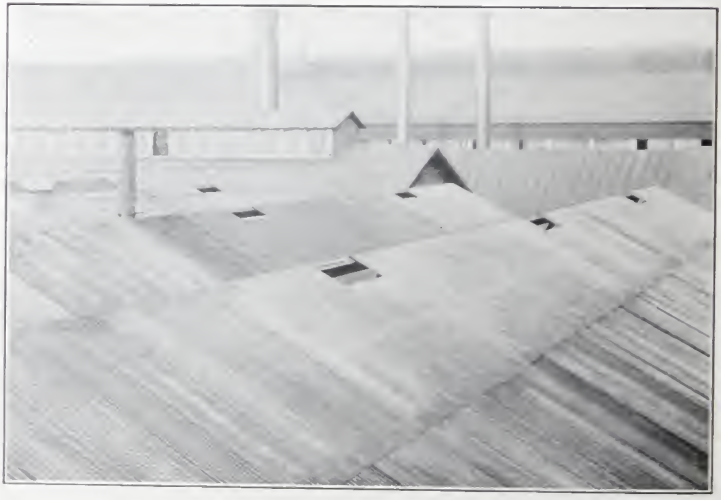
Mixture

Take one part Portland Cement and four parts clean sand or gravel and mix dry, thoroughly. Then add water and mix thoroughly to the consistency of thick mortar.

Depth

Apply to a depth of at least ½ inch above the top of the plate and work well so that there will be no voids, and so that each dove-tail will be completely filled. Then smooth the surface to a uniform level with a float.

Cross Section of Completed Roof



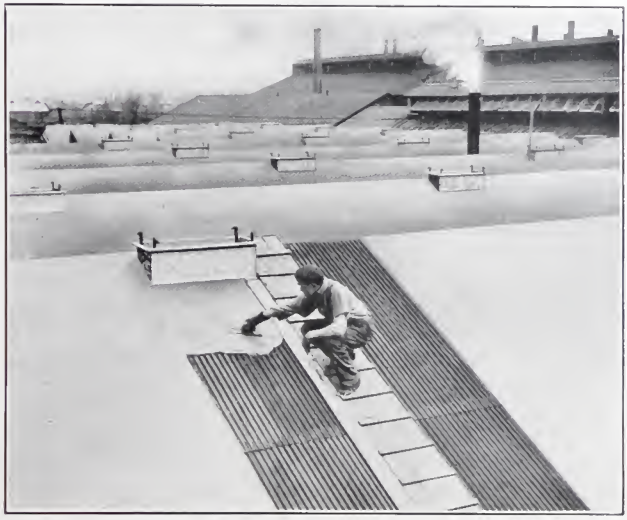
Showing Plates Applied and Ready for Ventilators and Concrete

The concrete should set gradually, and care should be exercised to prevent too rapid setting, as otherwise it will check and crack. In hot weather it should be shaded from the sun's rays by tarpaulins, old carpets or straw.

Setting

The concrete used in connection with Berger's Raydiant Vault and Sidewalk Lights used in skylight construction should be composed of one part Portland Cement, two parts of clean, sharp sand, and the work finished in the usual manner of finishing sidewalk or vault lights. Full information is furnished with each shipment.

For Skylights



Laying Concrete on FERRO-LITHIC Saw Tooth Roof

PLASTERING THE UNDERSIDE OF Ferro-Lithic

Mixture

Make a cement plaster composed of one part of good Portland Cement to two parts of clean, sharp sand, and with this mixture add two-fifths part of hydrated lime and hair. (The mixture of hydrated lime and hair is composed of four pounds of hair to five sacks of lime and should be made up and allowed to stand from two to three days.) This mixture of

Interior of Concrete Barn at Brae Hospital, Primos, Pa.
Curved FERRO-LITHIC Plates for Floors
Architect, O. H. Parry. Contractor, C. R. Knapp & Co.

sand, cement, hair and hydrated lime should be gauged on the board with patent hard plaster, the proper proportion being easily determined by the plasterer. The amount necessary will vary somewhat according to conditions.

Thickness

The plaster should be worked up into the corrugations thoroughly so that the steel will be completely coated and so

that there is at least 3/8 of an inch of plaster on the under side of the plate.

Application

In working this plaster it should not be applied as it would upon wood or metal lath, but a smaller amount should be taken on the trowel and worked into the corrugations with a stroke of the trowel back and forth without leaving the plaster. If the plaster is applied in this manner there will be no difficulty in applying same to plate.

Covering Plates

At the bearings of the purlins the plaster must be worked in thoroughly so as to coat the bearing strips and plates completely so that not a particle of steel is exposed.

FERRO-LITHIC Roof at Syracuse University Stadium Grand Stand
View from under side
Architects, Revels & Hallenbeck
Contractors, Consolidated Engineering & Construction Co.

WATERPROOFING A *Ferro-Lithic* ROOF

In Concrete

In waterproofing a concrete roof, same may be accomplished by including in the concrete itself any powder, which, when mixed with the concrete, will prevent any leakage through the slab.

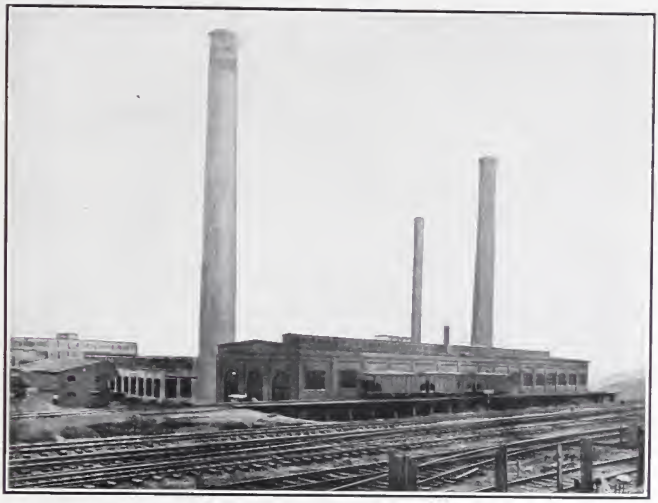
On Concrete

Unless the waterproofing is included in the concrete itself the concrete and plaster should be allowed to set from six to eight days, and then, while the concrete is dry, apply any first class composition roofing according to the direction of the manufacturer.

Flashing

All cut edges or ends at walls, chimneys, skylights, or elsewhere, should be well protected by flashing.

FERRO-LITHIC Saw Tooth Roof at Continental Motor Mfg. Co.
Muskegon, Mich.
Architects, Robinson & Campeau



Another view of The General Electric Power Plant, Pittsfield, Mass.
Where FERRO-LITHIC was used to such great advantage

FERRO-LITHIC Plates in position on the roof of The Grand Rapids Lighting & Pumping Plant, Grand Rapids, Mich.
Architects, Williamson & Crane. Contractors, C. Hoertz & Son

Garage of Cooley & Wilson, Joplin, Mo.
FERRO-LITHIC Plates Used for Floors and Roof
Engineers, H. C. Sahlman & Co.

Engineering Building at Union College, Schenectady, N. Y.
FERRO-LITHIC Plates for Floors and Roof. Berger Prong Lock Furring on First and Third Floors
Architects, Fuller & Robinson, Albany, N. Y.
Contractors, R. M. Booth, Albany, N. Y.

BERGER'S

Patented

Multiplex Steel Plate

for

Floor and Roofs

of

Steel Skeleton Buildings
Cemetery Vaults : Warehouses
Storage Houses : Elevators
Sugar Plantation Buildings
Penitentiaries : Jails
Bridges : Viaducts
Mining Properties
. . Etc. . .

Multiplex Steel Plate

Description

MULTIPLEX Steel Plates consist of steel sheets formed into a series of continuous corrugations, ending at the top and bottom in three half-circle arches separating the sides of these corrugations from each other. The depth of corrugations and gauge of material is varied according to the span and the load to be carried.

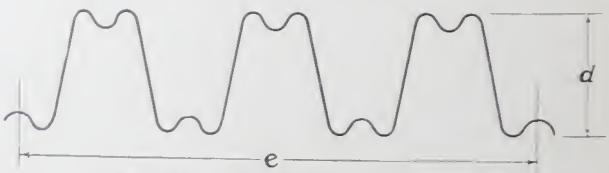
Laying and Concreting

In installing the plates they are placed upon the bearings and the upper portion of the manifold is filled with concrete which can be put on immediately and should be lightly tamped. While filling the plate the concrete is incidentally moulded into a series of concrete beams which reduce the dead load of concrete about thirty per cent.

Plate Details

MULTIPLEX Steel Plates are made of Nos. 16 to 24 gauge sheet steel, either painted or galvanized, and formed into corrugations with depths as listed below. (See end section, Figure 1.)

END SECTION OF MULTIPLEX STEEL PLATE



Depths 2", 2½", 3", 3½" and 4"

Fig. 1

d = depth.

When d = 2", e = 13½"
When d = 2½", e = 14"
When d = 3", e = 14½"
When d = 3½", e = 15"
When d = 4", e = 15"

e = effective covering width.

The smaller corrugations in the apex and in the base of the larger ones mould the concrete into a shape which serves as bridging or arching, and in this manner the steel is so assisted as to withstand an enormous compressive and tensile strain.

Simplicity

The construction is as near "fool-proof" as it is possible to construct.

FLOOR SYSTEMS

Bridge and Warehouse Floors

Figure 2 shows MULTIPLEX Steel Plate used in its simplest form, being that ordinarily found in bridge floor construction, warehouses, and similar work.

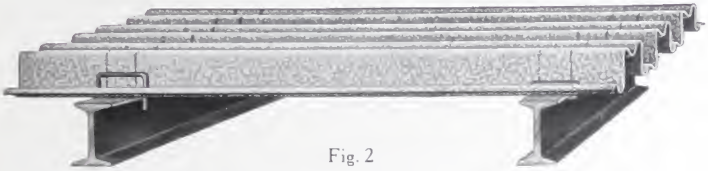


Fig. 2

Beam Clips

In this construction the plates are placed directly upon the upper flange of the I-Beam, sufficient lap (2″ to 3″) being provided at the plate ends, and the plates are securely anchored to the steel frame by means of beam clips as shown in the figure above mentioned. By the use of these beam clips the floor is securely anchored to the under framing and furthermore a lateral and diagonal bracing is provided.

Fig. 3

Flat Arch Construction

Figure 3 shows a method of installing a MULTIPLEX Steel Plate in such a manner that the finished concrete floor is

flush or level with the top flange of I-Beam. This construction is not used to a great extent because of the excessive dead load, but wherever such construction is practicable, the MULTIPLEX System offers the advantage of reduced weight because of a reduction in the amount of concrete. This flat arch construction is very strong.

Fig. 4

Floor Over Suspended Ceiling

Figure 4 shows the preferred method of constructing a floor with MULTIPLEX Steel Plate when such floor is used in Office Buildings, Hotels and buildings of this class. In this construction the MULTIPLEX Plate is placed upon the beams in the manner shown in Figure 4, after which the concrete is laid and nailing strips set for securing the top finish floor. The suspended ceiling is obtained by the use of Berger's Prong Lock (wireless) System of Furring, which is attached to the lower flange of I-Beam with clips. Upon this furring is placed B. B. (Berger's Best) Expanded Metal Lath, which is later plastered, so that the finished construction is complete with dead air space, wood floor and plastered ceiling—all steel being completely enclosed.

Fig. 5

Floor Over Beamed Ceiling

Figure 5 shows another method of floor construction for such structures as Office Buildings, Hotels, and buildings of that class, where a beam effect to the ceiling is desired. MULTIPLEX Steel Plates are applied in the usual manner on the top flange of I-Beam, and in placing the plate small lath prongs or clips (see Figures 6 and 7) are inserted, and around the beam is wrapped Berger's Cornice Furring, so that after the plates and clips and furring are in their proper position the Expanded Metal Lath is very easily applied to them. This is a first-class construction and is also one which permits of effective decoration.

Fig. 6
Lath Prong or Clip

Fig. 7

Rod Reinforcement

MULTIPLEX Steel Plates to be used to the best advantage should include small reinforcing rods in each manifold, or every other manifold, as the conditions may require. In installing the rods they are laid into place upon a small bed of concrete spread over the lower part of the arch mani-

fold, and they should be applied in the manner shown by Figures 8 and 8-A. The use of rods increases the efficiency of the system and they form a precautionary factor of the construction.

Method of Rod Reinforcement

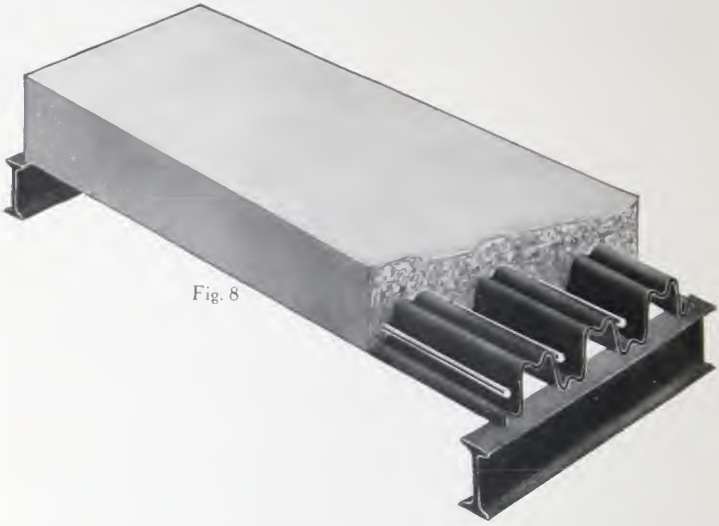


Fig. 8

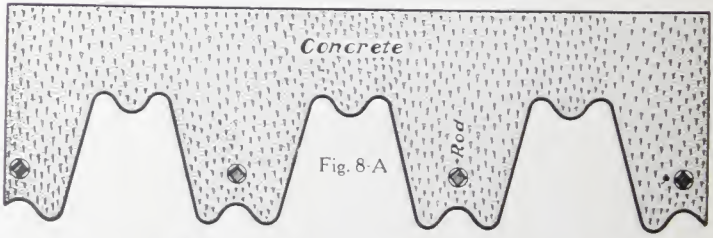


Fig. 8-A

Use of Expanded Metal

Expanded Metal is also sometimes used in the concrete above the plate for reinforcing, and also to prevent temperature cracks.

The MULTIPLEX Plates themselves are sufficiently strong and stiff to support the weight of workmen and material while concreting, and thus the construction is very easy.

Multiplex Steel Plate

for

BRIDGE FLOORS

Bridge Floors

MULTIPLEX Plates are especially well adapted to bridge floor construction in view of the fact that they provide the requisite strength and overcome the undesirable and difficult feature of properly centering a bridge floor with temporary wood centering. Highway bridge floors are usually constructed with the stringers from 2′ 0″ to 3′ 0″ on centers, which is a very desirable spacing and gives great strength to the construction.

MULTIPLEX Plates as used on Bridge Floors

Foreign Use

A desirable field of application of MULTIPLEX Plate is that found in mining countries, sugar plantations, tobacco warehouses, and structures of wide floor and roof area where it is not possible to obtain temporary wood centerings, or where other concrete construction is exceedingly difficult.

General View of Sugar Refinery, Guanica Centrale, Guanica, Porto Rico, in which MULTIPLEX Floor Construction is Installed
Engineers, Honolulu Iron Works Co.

Ease of Installation

MULTIPLEX Plate can be placed into position by the commonest labor and there is no opportunity of error, nor is there difficulty in making a first-class job.

Clean Ceilings Obtained

In addition, the underside of floor (forming the ceiling of room underneath) is a very clean one, which is a very desirable feature in sugar warehouses, tobacco factories, etc., and there is no opportunity for the sifting of dirt from one floor to another.

SAFE LOAD OF THE *Multiplex Steel Plate*

WITHOUT FILLING

METAL GAUGE NO.	DEPTH OF PLATE	*LOADS PER SQUARE FOOT IN POUNDS. DISTANCE BETWEEN SUPPORTS.							
		3′	4′	5′	6′	7′	8′	9′	10′
16	4″	3,103	1,736	1,105	762	555	421	330	264
18	4″	2,334	1,307	831	573	411	315	246	197
20	4″	1,659	928	589	406	295	223	174	138
22	4″	1,330	743	472	324	235	177	137	110
24	4″	1,051	588	391	277	199	165	130	102
16	3½″	2,753	1,543	982	678	494	375	293	234
18	3½″	2,067	1,157	736	507	369	280	219	175
20	3½″	1,463	818	520	358	260	197	154	120
22	3½″	1,104	617	391	269	196	147	114	91
24	3½″	957	548	336	233	171	132	103	83
16	3″	2,106	1,181	742	520	379	288	225	180
18	3″	1,589	910	567	391	286	216	169	136
20	3″	1,274	714	454	313	229	174	135	109
22	3″	906	507	322	222	161	122	95	77
24	3″	727	402	267	188	123	101	79	64
16	2½″	1,657	927	590	406	396	224	175	140
18	2½″	1,249	700	444	306	223	169	132	106
20	2½″	890	497	316	218	158	120	94	74
22	2½″	713	398	253	174	127	95	75	59
24	2½″	592	316	203	147	106	79	64	51
16	2″	970	544	345	236	171	130	100	80
18	2″	734	410	260	179	129	97	88	60
20	2″	592	330	209	145	105	79	62	49
22	2″	470	264	167	115	83	62	48	38
24	2″	352	197	119	87	64	48	39	31

* The above Safe Loads include weight of Plates.

Table prepared from *Actual Tests* under the direction of Hallstead & McNaugher, successors to G. W. G. Ferris & Co., Civil Engineers.

SAFE LOAD OF THE *Multiplex Steel Plate*

[1]FILLED WITH CONCRETE ONE INCH ABOVE PLATE

METAL GAUGE NO.	DEPTH OF PLATE	[2]LOAD PER SQUARE FOOT IN POUNDS. DISTANCE BETWEEN SUPPORTS.							
		3′	4′	5′	6′	7′	8′	9′	10′
16	4″	4,230	2,370	1,510	1,040	760	575	450	360
18	4″	3,180	1,780	1,130	780	570	430	335	270
20	4″	2,260	1,265	800	550	400	300	235	185
22	4″	1,810	1,010	640	435	320	240	185	145
24	4″	1,408	792	507	352	258	198	156	127
16	3½″	3,755	2,100	1,340	915	672	510	400	320
18	3½″	2,815	1,575	1,000	790	510	380	295	235
20	3½″	1,990	1,115	705	485	350	265	205	165
22	3½″	1,500	840	530	360	265	201	150	120
24	3½″	1,280	720	461	320	235	180	142	115
16	3″	2,820	1,610	1,025	705	515	390	305	240
18	3″	2,165	1,210	760	530	385	290	235	180
20	3″	1,730	970	615	420	305	230	180	145
22	3″	1,230	685	435	295	215	160	125	100
24	3″	978	550	352	244	169	137	109	88
16	2½″	2,260	1,265	905	555	405	305	240	190
18	2½″	1,700	950	605	415	305	230	180	140
20	2½″	1,210	675	430	295	215	160	125	100
22	2½″	970	540	340	235	175	130	100	80
24	2½″	770	433	277	192	143	108	86	69
16	2″	1,330	745	475	325	235	180	140	110
18	2″	1,005	560	355	245	180	135	120	85
20	2″	810	450	285	200	145	110	85	65
22	2″	640	350	230	155	115	85	65	50
24	2″	454	255	163	117	87	65	25	41

NOTE. (1). Concrete Filling consists of 1 part best cement, 3 parts clean, sharp, angular sand, mixed with 5 parts of pure crushed furnace slag.

(2). Load is total Safe Load less weight of Concrete Filling and weight of plate itself.

(3). Estimated weight of concrete per cubic foot, 90 pounds.

(4). These tables represent safe loads with factor of safety of four and show the strength of new work. For absolute permanence and as additional factor of safety it is recommended that rods be added according to specific requirements. Expanded Metal may also be used.

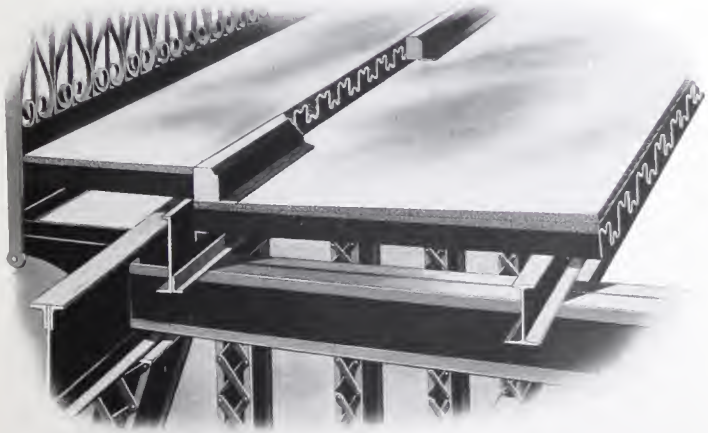
Table prepared from *Actual Tests* under the direction of Hallstead & McNaugher, successors to G. W. G. Ferrie & Co., Civil Engineers.

Ordering

In ordering MULTIPLEX Steel Plate send sketch or blue print, if possible, showing the general lay-out, including openings, supporting walls, beams or other supports on which the ends of the plates are to rest. These plates should have from 2 to 3 inch bearing on each end and, where the construction is continued over a number of beams, a lap of 3 inches of the plates at plate ends to be provided.

In ordering indicate whether or not length of plates must be exact, or whether a variation in length of from 0′ to 1″ will be permissible.

The maximum length of plate is 10′ 0″.



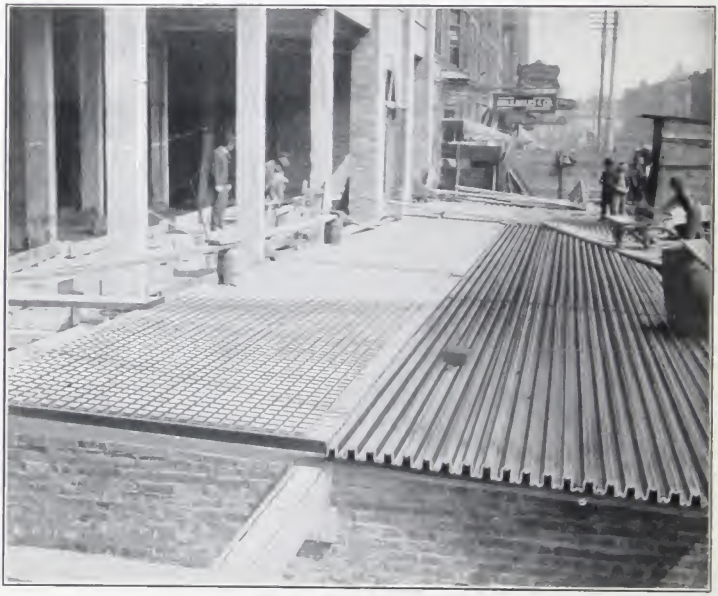
Designing

In selecting the size and gauge of plates to be used refer to table of safe loads as given on pages 77 and 78, and compare loads shown in the table with that necessary to support. The tables are prepared without reinforcement of rods, and by the addition of small rods a desirable and inexpensive factor of safety is secured.

Designers can obtain advice and further details of construction, covering size and gauge of plate and size of rods, by presenting full data as to span, load, conditions of service, etc., etc.

Bracing

In placing plates for long span, brace the center of span so as to provide against deflection during concreting. This is not always necessary and will apply only to special cases.



"Raydiant" Vault Lights Adjoining Building
MULTIPLEX Plates from Vault Lights to Curb

Exact Mesh

BERGER'S B. B. EXPANDED METAL LATH

MADE IN PLAIN, PAINTED AND GALVANIZED

By a new process of manufacture the small neat mesh is formed by the natural bend of the strands in expanding the metal, overcoming any tendency to rupture the fabric.

Berger's Metal Lath is made from sheets especially prepared so that no pickling is required, and at the same time the product is toughened, increasing its durability.

The narrow strands allow the mortar to completely imbed the lath on both sides, the clinch bonding on the back.

Sizes—Sheets, 18 inches wide; 96 inches long.

Bundles—Number of Sheets in a Bundle, 9; Number of Yards in a Bundle, 12.

Gauges	Weight per Bundle	Weight per Yard	Yards in 100 lbs.
No. 27	27½ lbs.	2⅛ lbs.	43
No. 26	30	2½	40
Special	36	3	34
No. 24	40½	3.4	29

Prices upon application.

Ordering—Specify number, yards and gauge desired. Whether plain, painted or galvanized.

BERGER'S

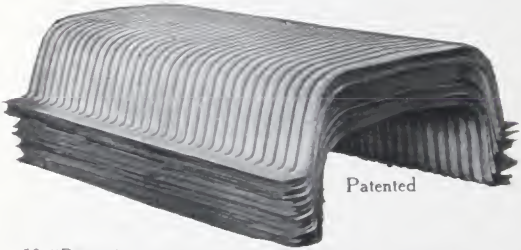
PRESSED STEEL CORES

For Coring out and forming Joists in long span Concrete Floor Construction.

Send for Designing Data.

Standard Core

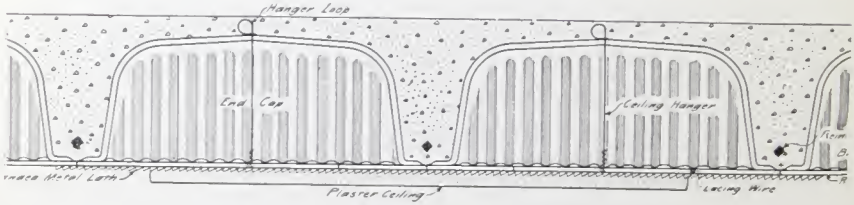
End Cap



50 "Berger's Pressed Steel Cores" ready for shipment. Covering area 325 sq. feet.

Some of the advantages:

Cheap transportation. Quick and easy to handle and put to place. Saves Concrete. Saves dead load of floor. Ceiling can be applied after pipes and wires have been placed.



Patented

Section through Finished Floor and Ceiling Showing Simple Method of Ceiling Construction